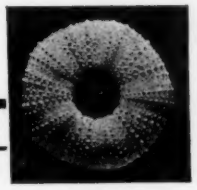
MAIN CURRENTS IN MODERN THOUGHT

A monthly service that brings together contemporary data in all fields, as these issue from laboratories, studios, class-rooms, observatories and wherever man pursues the eternally intriguing and beautiful mysteries of Nature



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ORDER

Editorial Summary

IT NOW SEEMS CLEAR that a first and exploratory unification of knowledge right across all fields of human experience awaits recognition that order, in the wide sense of symmetry in space and harmony in time, is coextensive with order in the limited sense of dependable law. The old phrase, "law and order," calls our attention to the difference between the two aspects of Nature, a difference perfectly clear as between properties of matter and properties of living creatures.

Perhaps the decay of society has been somewhat due to our losing sight of the higher meaning of the word "order." If this is so, the subject of order in that higher sense is of immediate importance.

Unfortunately for the layman, the harmony of nature is best perceived as an intellectual fact by the mathematician's "eye of the mind." A direct perception of order through the senses runs immediately up against the difference between forms of perception — especially between sight and hearing. Sight is a sense through which we have scientific knowledge of law, and artistic perception of order. Hearing is a sense in which the order constituent is so high that in it science and art can meet. The glory we call music depends on a relatively coarse medium — air percussion waves. Its subtlety arises from our perception of an exquisitely fine series of overtones, which are infinitely various modulations of simple integers, hence the delicately contrasted timbres of instrumental music. These, and an ephemeral quality as to time, can provide an unearthly appeal, coarse as the medium is. That much is quite clear to us when we contrast instruments with few overtones, such as drums, with instruments having oddly-spaced overtones, such as the oboe, and with the smoother qualities of the clarinet.

The ear, as the receiving instrument of sound, is in itself constructed along the lines of a stringed instrument. The characteristic vibrations of the ear are describable with the help of the Fourier series, the first historically and still the most beautiful and most important example of what are called orthogonal series. In the vibrating stringed instruments, and in the flute, are some of the few instances of vibrations wherein the Fourier series appears by itself.

Sight, in contrast, introduces a wonderful new world of subtleties which cannot be described in simple terms, for, indeed, the ethereal nature of its medium — light — allows it to cast its own peculiar glory over solid objects. From their form and texture, by absorption and reflection, refraction and diffusion, we obtain the delights of vision — not from any absolute simple harmony as yet recognized in the spectrum itself.

Certainly we have no standards equivalent to musical instruments, and simple integral harmonics, to give us light and colour in combinations which receive universal approval as agreeable in art. To be sure, there are some absolutes — the spectral lines of the elements, for example — but no simple harmonic series of overtones can be found in these, even though the elements do lie in a well-known periodic order; and even though Aston and others were able from spectral lines to locate unknown elements. What are called "band spectra" of molecules are an approximately harmonic series. The spectral lines of elements do not show in general periodic properties as do the acoustical spectra.

The discovery of a true simple harmony in light and colour or the reduction of the present theories to simple form would be of very great importance to life and thought. Many problems, such as protective coloration and mimicry in nature, remain unsolved — remain even to-day just raw facts. There seem to be odd leads, too, from colour to useful and even basic meanings in Nature. The well-recognised fact that the vitamins have a rough approximation to the spectral series is one such lead, and a clearance here might lead to something of great value regarding their relations, both as to their origins and in their uses in bodily metabolism. One glimpse of the dye industry, beautifully reviewed in an article on Dyes and Dyeing by Hanor A. Webb of the George Peabody College for Teachers, Nashville, Tennessee (in *Chemical Education*, October, 1942) shows us the importance of the subject. Yet, though attempts at colour therapeutics, both physiological and mental, are renewed repeatedly, we still walk in darkness as to colour — we see as through a glass darkly, though life itself "like a dome of many-coloured glass, stains the white radiance of eternity."

As these words were shaped, a basic book bearing on this subject comes to notice. This is *Sensation and Perception in the History of Experimental Psychology*, by Edwin G. Boring of Harvard University. This is a work that indicates notably the tendency of our times to get to the bottom of this business of experience and to proceed with great caution. Indeed, the author says, in his last chapter: "If scientists need to determine the constants of their instruments, then they should

remember further that the primary instrument of all science, the human mind, also has its errors and its constants of which they need to be aware — and to beware." (We shall consider this volume in detail later.)

For the final satisfaction upon the historical aspect of such a subject, surveys should and must include more than the scientific thinking of Europe. The concepts of space, time, atomism, consciousness, in the thought of Asia, are rich and provocative. Nothing in known European history, for example, matches the daring notion of the Akâsha in Indian realism (Nyaya-Vaisheshika, or logical atomism): a web of time-space world-lines with harmonic properties. This is better fitted to contemporary thought, as a matter of fact, than even our (now) rightly much-read Plato. Even upon the present basis of knowledge, the subject of order common to all senses is of the greatest worth and interest.

Sight depends upon that single octave of electromagnetic waves which we call light. The use of the word "octave" here is in the simple sense that a certain wave-length in the red end of the spectrum is twice the length (or half the frequency) of a certain wave-length in the violet. This small band of waves is part of the great spectrum of waves of electromagnetism, some seventy octaves in compass, which includes the now familiar radio waves and X-rays. Of these seventy octaves, it is notable that almost exactly one octave only is visible as light to the average vision, in man at least.

This single octave or band is significantly connected with the life-process also, since without sunlight there is no physical life possible as we know it, and sunlight has its maximum energy-intensity in this visible octave. Plainly, this whole scheme of light and life operates in an orderly way. The question is whether the order is in life, or in the electromagnetic series, or in a deeper system common to both.

Something of the nature of the problem may be seen in the case of chlorophyll and its congeners, which are crucial to all physical life. Chlorophyll A is a molecule containing as many as 136 atoms: $C_{55}H_{70}O_6N_4MG$. In this molecule, the last atom, Mg (magnesium) is enormously significant. For though this chlorophyll constitutes the green element in plants, through which sunlight is poured to convert sap into sugar, thus making all plant and animal life possible (therefore chlorophyll may be regarded as a highly specific substance), the substitution of *one* copper atom for the *one* magnesium atom converts the chlorophyll into another life element altogether, an element essential to lower animals — the substance hæmocyanin — while, if the one magnesium atom is supplanted by one atom of iron, we have the red blood hæmoglobin of the higher animals, including man.

This factor can hardly be exaggerated in philosophical significance. What is the meaning of this atom-substitution, and how do electromagnetic waves act upon it, in each case? The function is partly the utilisation of sunlight, as is illustrated by the health-giving effects of sun-bathing and the pathological effects of deprivation. So, though the iron atom has important use as an efficient oxygen-carrier, we still have probably some function related to sunlight, while it may not be sunlight alone in the case of hæmocyanin and hæmoglobin, but other electromagnetic waves as well.

Philosophically, then, we have a pattern — a molecule — which persists and is required for life. Can we doubt that there is a connection between such inward, fine-world patterns of all kinds, and life-forms and -orders from chromosomes up and down the scale of sizes, in terms of an essential geometry of life? Are we to ignore the presence of so much geometry in Nature and the place geometry has in all forms of knowledge (including the physical sciences to-day), and thus suppose that these exquisite details are not part of a larger whole — a geometry of the organism derived from or referable to space-time geometry?

Another question arises: Is there harmony in the electromagnetic series which matches the molecular designs, or is the order only in the molecules, cells, and organs, which take what they want from the uniformity of light and electromagnetism generally? Our sense of sight detects no order in the colour series, in an intellectual and measurable sense comparable to the musical order, for the reason (mentioned above) that the ear is constructed in a manner suited to detect that order.

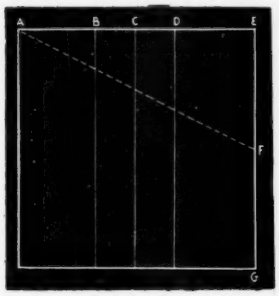
There is also another great difference between sight and hearing. Sound waves are quite different from light waves in their character as well as in the medium in which they operate. For sound waves in air are one-dimensional, or two-dimensional if time is also considered. Hence a three-dimensional structure, the ear, would be, and, as we know it, is, adequate to perceive them. But ether waves are three- or (with time) four-dimensional; and how can a three-dimensional organ — even the eye, so beautifully designed in spherical form — be counted upon to report on the whole effect, including any harmonious element?

The ear is a harp for time, associated with the semicircular canals for space, through the dual eighth cranial nerve. But the eye has to record, in its fine-world chemistry of the visual purple, rods and cones, such parts of the whole as it can get. We see, therefore, in section only, so to speak. If the eye, like the ear, were associated with one or two other organs suited to report on other aspects of the whole of sight, then the same true octave principle of harmonious sound-perception through the ear might conceivably be apparent in colour. In order to get even the rich return in dimensions that we get in vision (colour, intensity, hue), we are deprived of depth, which must be educated into it.

There is still another aspect of these divergencies between hearing and sight. The symmetrical or geometrical and harmonious characteristics of hearing are linked by simple and well-known facts. The vibration of a string in one, two, three, four and more integral parts to produce overtones is familiar to everyone. This series is, in most practical music, pretty much limited (as the crystal series is) to seven, because in the case of the piano at least the energy fades steeply at the seventh overtone. Thus dissonance is kept within bounds.

The same simple integral union of harmony and number is found in other geometries of sound, such

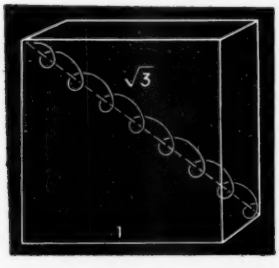
as that of Euclid's lyre. In this a square is constructed bearing five strings, at A, B, C, D, E. The string C divides the square into halves, and the strings B and D into thirds, as shown. These strings of the same material, diameter and tension, and of equal length, give the same note. When a bridge is erected under them from A to F, midpoint of EG, the segments of string, when plucked, give an inverted minor chord. The association of simple symmetrical form with simple harmonious sound is thus evident.



In the case of light and colour it is obvious that we are dealing with vastly more subtle relations, involving more dimensions, and a state of affairs which could be discussed only by drawing upon the magnificent developments from Rayleigh to Schrödinger, and a broad formulation of harmonic analysis outside the realm of the simple Fourier series. These grand achievements point to a wonderful example of the basic unity of Nature, which may be pursued on another occasion. However, a very simple (and purely theoretical) instance of what is involved when we proceed from dimension to dimension gives us some inkling that the ultimate answer in a search for order must take higher dimensions into account.

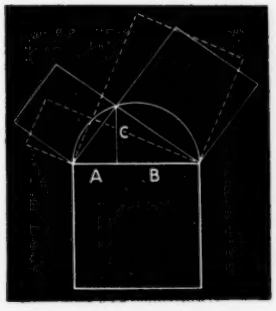
Energy in two dimensions might be pictured by a simple diagonal wave in a square, as shown. In three dimensions it may be depicted, merely ideally, as a helix in the diagonal of a cube. In both these cases the number of the diagonal length is incommensurable to the side, taken of course as one, being $\sqrt{2}$ in the first case and $\sqrt{3}$ in the second.

Thus the relation between side and diagonal is not simply harmonic. A cube in the fourth dimension provides, however, a framework in which the sides are still unity, but the diagonal is now $\sqrt{4}$, or 2, the octave number of the side. Thus in a fourth dimension, harmony may be conceived as constituent with energy. As electromagnetics are regarded as going on in hyperspace, it is clear that our answer as regards light or colour must be sought therein.



Through the ceaseless efforts of a generation of young physicists, the characteristic frequencies and forms of vibrations of quite a number of atoms have been determined much more elaborately than the corresponding problems of musical instruments. Based on the famous wave equation of Schrödinger, the overtones of the atom which determine its quantum states, and thus all its physical and chemical properties, have been worked out, so that the atom is treated as a musical instrument. It is true that the resulting "harmonies" go far beyond our ordinary experience or concept of harmony. But as the mathematical instrument in use is of exactly the same type as that introduced by Rayleigh in the investigation of musical instruments it seems we may assume an essentially like character in the two systems, musical and visual.

If we allow ourselves another simple illustration (this time, of motion), it may make clear how the sumptuary allowance of higher dimensions seems to bring in harmonious relations which otherwise may elude us. This illustration again is offered only to point up the argument that a superior order must be sought in a hyperspace domain. Cauchy's studies of functions in the "complex plane" is a real example of logical behaviour becoming apparent in two dimensions, in certain cases, when the logic is not apparent in one dimension. The following paragraph brings the main point forward in a simple fashion.



When we look at the sides of a series of right-angled triangles in a semicircle, they seem to have no enduring relation. But, when we pass from the lines, or one dimension, to the squares on these sides, we see that their sum is always equal to the same quantity; namely, the square on their hypotenuse. The whole operation is a property of circles, and the perpendicular C is always a geometrical mean between A and B. Thus it appears, from very rudimentary aspects of geometry and order, that our solutions lie in the geometry of orders of space higher than those which we are accustomed to consider in daily life.

Until we are habituated to this geometry, mankind will go on depending for its basic ideas of mutual relations between life, light, and musical harmony on such phrases as "In the begining was the Word," or "Let there be Light." Our ethics also must rest at a correspondingly uncritical level, in primitive associations of light with goodness and health, and darkness with disease and evil. Of course, such phrases are true enough, so far as they go. Developments in modern thought, however, make them insufficient for present requirements. Hence the desperate need of some school wherein experts in higher branches of knowledge will come to grips with the ethical, the social, and the economic outworkings of the technologies, and the advanced inquiries of recent decades.

As yet, the required cross-connections over the sciences are only in a tantalizing state, shadows which may be as misleading as they are alluring. The good connections are almost entirely limited to single sciences, laws and theories. In a few cases these sound

interlockings give a solid basis from which it is reasonable to hope for larger meanings. Thus, in our present theme, the techniques of mathematics that have resulted in so much knowldge about light tie together knowledge of the flow of heat, of electricity and musical harmonies in an interesting department of mathematics called "spherical harmonics," the study of a vibrating shell as part of a sphere. In the simple analysis of a vibrating string, the overtones are harmonic and the Fourier series applies. The string is, of course, one-dimensional in its application here. In the case of a rectangular plate covered with lycopodium powder and bowed, we get the well-known, two-dimensional, Chladni figures: the component overtones are harmonic, and the Fourier analysis is in two directions. In vibrating circular plates, such as a drum, the angular direction requires the Fourier series, the radial direction requires the Bessel functions. On the vibrating shell of a sphere, the angular direction is described by the Fourier series, the radial by the Legendre and Laplace spherical harmonics. Thus a gradual enlargement of the harmonic concept ensues. And the point may be made that we arrive at a species of integrating of themes by pursuing studies of the harmonious unity of Nature, subject-matters so far apart in ordinary experience as heat, light and musical sound.

Why cannot such cross-webbings be extended between sciences? Is not the answer that the physical sciences have with the help of mathematics made strides out of all proportion to the concurrent developments in biology and in psychology? And may it not be said that a search for harmonious process under biological data is an imperative need to-day? And are not the developments in psychology, along lines of the ganzheit, extremely important, implying, as they do, *harmony*, as against Freudian *conflict*? And in general may it not with confidence be said that if the physical sciences have done so much in the pursuit of harmony by advancing boldly into hyperspace, a correspondingly rich reward consequent upon subsuming biology and psychology within the same domain awaits those other sciences? F.K.

RECENT ITEMS

Colour Waves

In a theoretical discussion of the nature of colour in organic compounds, P. V. Zolotarev states that every long wave ray is a primary ray with a distorted amplitude. There is therefore no obstacle to the possibility of interference of all rays which will lead to the mutual levelling of the distorted energy of the primary rays at a distance from the radiating body. This leads to the conclusion that there can be *no levelling of energy in the universe as might be expected from the 2nd Law of Thermodynamics*, which holds true only in limited space filled with material bodies. There can also be no Planck's distribution of energy in the universe because the universe is not a system limited by material walls, which is the basic condition of Planck's distribution of energy. (Transactions of the Institute of Chemical Technology Ivanovo, U.S.S.R., 1940, No. 3, 5.21, through Chemical Abstracts 35, 2784, 1941)

Colour and Emotions

The many curious associations and impressions gained by people when the major hues of the spectrum are presented to view were the subject of a study made recently by the Color Research Laboratory of the Eagle Printing Ink Corporation. Red, as a colour, seems hot, dry and opaque in quality, this study showed. Being sharply focussed by the eye it suggests angular forms. Orange is less earthly than red. It is warm rather than hot, but it is also dry. Its appearance is glowing and somewhat metallic.

"Yellow is also warm and dry, and also very luminous. Where red is bulky and heavy, yellow is more sunny and spatial. Being the colour of highest visibility in the spectrum it is sharp and precise in form. Green is cool and moist in quality. Blue is cold, wet and suggestive of things transparent — sky and water. Because blue is a retiring colour and tends to blur on the retina, it suggests round and soft rather than angular forms. Purple is cool, refined and extremely atmospheric. It is remindful of shadow and distance. While these generalizations are frankly emotional, they seem to find confirmation in the associations of most people." (Witcombings, published by Wishnick-Tumpeer Inc., 295 Madison Ave., New York City, 8, 8 Aug., 1942)

Cometary Tails

In discussing some of the recent results which have been derived by the spectroscopic study of molecules in astronomical bodies, including comets, Dr. Henry Norris Russell, Head of the Department of Astronomy and Director of the Observatory at Princeton University points out that "the list of molecules so far observed spectroscopically in comets looks very queer to the student of chemistry. It includes CH,NH,OH,CN, C_2 and also CH+,CO+,N_2+ and probably OH+ and NH+.

"None of these ten 'molecules' is what the chemist would ordinarily call by that name. They are all fragments of molecules of the familiar kind and in an ordinary book on chemistry the first five would be called 'free radicals' and the others 'ions'. In the laboratory they are all unsaturated and eager to combine with anything available that comes near, and so form stable molecules of the common sort. . . . Though they are not chemically stable in the sense that they can persist in an environment full of other molecules and atoms, they are physically stable—that is, they have no tendency to break up spontaneously into separate atoms.

"They are still very ready to pick up other atoms or molecules however—if they get the chance. But the

gaseous parts of a comet are of such exceedingly low density that collisions of one molecule with another must be almost completely absent. So the unsaturated molecules remain as they are, not because they won't combine with others, but because they don't get a chance." (Scientific American 98,158, Oct., 1942)

Shells of Planets

"HYDROGEN, so compressed that in effect it is a metal, may compose part of the innermost layers of the outer shells of the planets Jupiter and Saturn, according to Dr. C. L. Critchfield, Harvard University physicist, in a report in the September issue of the Astrophysical Journal.

"Pure hydrogen, Dr. Critchfield suggests, may form the outer shells of the planets to a depth of about one half of their radii. The outermost layer of this shell consists of compressed, but otherwise gaseous, hydrogen. In the innermost layers, however, the hydrogen is compressed to such an extent that it forms a peculiar and as yet undiscovered form of what is called 'a badly centered cubic form'. This is, in effect, a metal.

"Astronomers concluded many years ago that Jupiter and Saturn had inner cores consisting of heavy elements such as iron, and an outer shell with a density less than that of water." (William L. Laurence, New York TIMES, Sept. 13, 1942.)

Crystal Reärrangement

"ENOUGH NICKEL to make armour plate for 55 medium tanks will be conserved during 1942 by the Westinghouse Electric and Manufacturing Company, through the substitution of Hipersil steel for a nickel alloy, in the manufacture of Ignitrons. Hipersil steel, a special silicon steel, is produced by certain melting, heat treatment, and rolling techniques that reärrange the crystals and improve its magnetic qualities. This method of steel treatment trains the metal's invisible crystals to 'fall into line' and become better magnetic paths, with the result that Hipersil steel carries one third more magnetic flux or magnetism, than ordinary steel." (Scientific American, 98,109, Sept., 1942)

In Main Currents 1 (4) 3, February, 1941, appeared an item from Science Supplement 81,9, Feb. 22, 1935, telling that Bitter, experimenting with metals and magnetism, found that if the metal is first stretched, it is easier to magnetize. He explained this phenomenon by a lining up of the atoms, assuming the tiny atoms of the metal to be egg-shaped and free to turn; and he suggested that the effect of either tension or magnetization was to orient the long axes of the atoms in the direction of the applied force.

Streams From the Sun

MAGNETIC STORMS that interrupt radio communications and cause magnetic needles to become jumpy may be due to holes in the ionosphere, the electrical "mirror" high above the ground which reflects radio waves back to earth. The holes are punched by streams of atomic fragments from the sun. This view is expressed by T. L. Eckersley in the British scientific journal Nature.

"The streams from the sun, [he holds], are composed of equal numbers of positively charged protons and negatively charged electrons. The protons, being heavier, penetrate the atmosphere more deeply, so that two oppositely charged layers are formed, the protons below, the electrons above. A localised neutral stream, however, may sweep a space clear of charged particles, thus leaving a hole in the ionosphere. This is the cause of magnetic storms, according to Mr. Eckersley, who finds there is 'much evidence for the existence of these holes'." (New York TIMES, Sept. 20, 1942)

Photographic Effect of Zinc

AT THE ANNUAL meeting of the Southeastern section of the American Physical Society, Paul S. Delaup and Quentin Holdeman of Southwestern Louisiana Institute presented the results of their investigations on the darkening of photographic film by a zinc plate placed near the film.

"By performing the experiment in a mine far below ground it was shown that the effect was not due to cosmic rays as has been suggested by another investigator. It was also shown that the effect was not due to the impact of slow-speed positive or negative particles." (Physical Review 61,726, June 1, and 15, 1942)

Inter-Planetary Substance

"A SUBSTANCE impossible on this earth but lying in the vast stretches of so-called 'empty space' partly clears up an astronomical mystery of long standing. The substance is called hydrogen carbide or carbon hydride—but astronomers simply call it CH, for the molecule is composed of one atom of carbon and one atom of hydrogen. Its discovery was accomplished by two Canadian physicists, Dr. A. E. Douglas of the National Research Laboratories in Ottawa and Professor G. Herzberg, of the University of Saskatchewan.

"Astronomers examining the stars with this instrument (the spectronometer) have noted four sharp lines which did not correspond with those of any known substance. On theoretical grounds and as a result of mathematical calculations they attibuted them to CH, existing in the space between the stars. But the astronomers could not be sure of their conclusions, because CH does not exist on the earth and its lines have never been seen.

"The reason why CH, and we may add CH_2 and CH_3, are 'impossible' compounds on this earth is that the normal quota of the carbon atom is four atoms of hydrogen. If it has a less number, it is unsatisfied or unsaturated and immediately sets out to fill its quota. The carbon atom has no difficulty here (on earth) in filling its quota with plenty of materials close at hand: 500-billion-billion molecules to a cubic inch of air. But out there in 'empty space', it is believed that there is only about one atom or molecule to a cubic yard. The carbon atom would be lucky to get even one hydrogen atom to share its loneliness and, however much it might yearn for more, it would be a long time before it got any. CH can therefore exist for prolonged periods in 'empty space.'

"Twice before, mysterious spectral lines have puzzled astronomers. They were then attributed to new elements not yet discovered on earth, but in both cases they turned out to be very common earthly substances, in a peculiar state. Mysterious green lines seen in the spectra of nebulæ were attributed to an unknown element, which was called 'nebulium', but this was simply oxygen and nitrogen emitting 'forbidden lines', possible only when these gases are extremely attenuated. A conspicuous green line and others in the sun's corona were attributed to an unearthly element and named 'coronium', but it is now believed that these lines are probably due to atoms of iron and calcium stripped of most of their electrons by some powerful agency. In any case it is believed that all possible elements have now been discovered. No new ones will be found in the sky." (May the layman ask 'how do you know?') (From Science Supplement 96,10, Sept. 4, 1942)

Cause in the Life-Process

"THE PROBLEM of causation is less discussed and more difficult in biology than it is in physics. Probably this is because physical sciences can deal with changing events within a 'machine' or system which is itself almost completely static. In biology, on the other hand, these two factors merge, and the 'machine' degenerates into a steady state which is the product of anabolism and catabolism. In addition to being a physical system, the organism seems to have an additional factor of inner or volitional determination, of which behaviourism can give only a partial account. Organisms are causal systems, combining the maximum complexity of organization and activity with an equal degree of constancy and reproducibility in extremely complex biological and psychological traits, and continually resisting the thermo dynamic and chemical tendencies which act toward the destruction of complex, fine-grained systems. Since analysis reveals the complexity of the system but fails to give a satisfactory account of its unity, it seems probable that biology is destined to become more and more a science of synthesis. The constants of synthesis, whether in the field of biology or psychology, cannot be wholly reducible to the physical constants, and physical atomism must be taken to be an abstractional procedure thoroughly warranted by the facts but not completely descriptive of observed reality. The synthetic factor may be identified as mind, and the organism as a whole as a psychophysical system. Biological stability is predicated upon physical stability, and biological causation upon universal causation. If novelty appears in the world, it cannot be accounted for in the rules previously existent, but must require new rules. The necessity for variation in biology is for something new, and from this demand there is no escape in the attempt to assign definite causes to biological mutation. There would seem to be no escape from the ascription of a certain variable element of spontaneity to natural processes in general." — L. J. Lafleur (abst. on Ralph S. Lillie, University of Chicago, Biological Causation. Philosophy of Science 7(3) 314-336. 1940)

How Big the Moon!

THE MASS of the moon is now found to be 1/81.271 of the earth's mass, instead of 1/81.56 as previously supposed. The probable error is plus or minus 0.021. The latest figure was calculated by Dr. H. Spencer Jones, Astronomer Royal of England. It is a by-product of his discovery last year that the mean distance of the sun from the earth is 93,003,000 miles instead of the previously accepted 92,870,000 miles. (Science Supplement, 96, 10 Aug. 21, 1942)

Springtime Disorders

A SERIES OF interesting hypotheses is proposed: mental disorder, suicides, and so forth, are more frequent in Spring. Light has a stimulating effect upon the gonads, perhaps through the hypophysis by way of the retino-hypophyseal connections (Frey). E. E. Krapf describes some researches on the psychosexual behaviour of the blind. (An abstract by J. E. MacKinnon in Biological Abstracts, from The Light as a Psychophysical Stimulant and the Retino-hypophyseal Nervous System, in Annals of the Faculty of Medicine, Montevideo. Special issue, homage to L. Fraenkel: 185-192. 1940).

GENETICS & EVOLUTION TODAY

Book Notice

AS WE RECEDE from the year in which Mendel's laws of inheritance came to light, it seems more and more clear that this date, 1900, was more than a calendar ending of an old century. It marked the entry into a new epoch of thought in biology as certainly as the developments of mathematical physics became at the same time crucial in their domain. If we add the formulation of the gestalt notion in psychology, we are able to say that all great departments of knowledge — of matter, of life, of consciousness — took a turning together away from disorder, from crass materialism and chance, toward order, transcendentalism and meaning.

The publication, therefore, by Columbia University Press of a second edition of Dobzhansky's comprehensive review of the whole subject of *Genetics and the Origin of Species*, is an event for anyone interested in really great moments of thought.

The comparison made above between parallel events in biology and physics appears to be sound, now that we have retreated forty years from the events. For in physics the problems of the fine world and the great world, of atoms and nebulæ, are far from unified even though a kind of geometry has been devised to unite them — Riemannian space-time. In this geometry the infinitesimal and hence atomic is Euclidean, and the macrocosm of starry systems spherical. Precisely analogous is the situation in biology as between the individual creature and the whole biotic realm or any one population. We quote our author:

"Since evolution is a change in the genetic composi-

tion of populations, the mechanisms of evolution constitute problems of population genetics. Of course, changes observed in populations may be of very different orders of magnitude, from those induced in a herd of domestic animals by the introduction of a new sire to phylogenetic changes leading to the origin of new classes of organisms. . . . Experience seems to show . . . that there is no way toward an understanding of the mechanisms of macroëvolutionary changes, which require time on a geological scale, other than through a full comprehension of the microëvolutionary processes observable within the span of a human lifetime and often controlled by man's will. For this reason we are compelled at the present level of knowledge reluctantly to put a sign of equality between the mechanisms of macro- and micro-evolution, and, proceeding on this assumption, to push our investigations as far ahead as this working hypothesis will permit. . . ."

"The phenotype is . . . what a living being appears to be to our sense organs. The genotype is the genetic constitution, the sum total of the hereditary factors received by the organism from its ancestors. . . . A phenotype is always the resultant of the interactions between a genotype and an environment. . . ."

"It is vastly easier to render an organism sterile or to destroy it altogether than it is to produce the slightest change in the genotype. . . . Inheritance of acquired characters — a reflection of phenotypic changes in the structure of the genotype — apparently does not take place. . . . Unfortunately, in the heat of the polemics against Lamarckism some statements have been made by geneticists which do not contribute to a clarification of the issues: to this class belongs the assertion that the genotype is not influenced by the environment. . . . The 'determining environment' is, however, not merely the one prevailing at the moment, but rather it is the sum of the historical environments to which the organism had been exposed in its phylogeny. . . . Evolution is possible only because heredity is counteracted by another agent opposite in effect — namely, mutation. In genotypically homogeneous populations, hereditary variation sooner or later arises *de novo*. . . ."

"The mutation concept has had a tortuous history. Not only has the term changed repeatedly in meaning, but even now it is being used in at least two different senses. Alternatives to the term 'mutation' have been proposed, but all of them have failed of adoption. Many years ago, Waagen (1869) designated as mutations the smallest perceptible changes in the temporal series of forms in a species of ammonites; these changes have a definite direction, and their gradual accumulation with the passage of time leads to the appearance of types progressively more distinct from the progenitor. To what extent Waagen's mutations correspond to the mutational steps observed by geneticists is an open question.

"The creators of the mutation theory were Korjinsky and De Vries. The latter (De Vries, 1901) defines it as follows. 'As the theory of mutation I designate the statement that the properties of organisms are built from sharply distinct units. . . . Intergrades, which are so numerous between the external forms of plants and animals, exist between these units no more than between the molecules of chemistry.' A mutation is, then, a change in one of the units which at present are known as genes. The comparison of genes with chemical molecules may prove to be a truly prophetic one."

This book, invaluable as a recent survey of a vastly important field, adds to a growing conviction that time and effort are being wasted on a large scale by not pausing long enough to discover if cross-connections over all knowledge cannot now be set up. Geology and biology, for instance, are as much parts of one whole as light and astronomy are. In the latter case the union of the fields has been achieved. In the former few broad decisions have yet been made. The union is purely practical, so far. The principles of the two sciences, geology and biology, are far from being established as a common possession.

Yet problems such as the speed of mutational changes in various species are locked in what may be called the over-all design of evolution, from which we must have geological data before us in generalised or law-form. For example, the four great epochs of geology clearly have something to do with the four Kingdoms of Nature. Nature has a time-order, that is to say, and mutation rates presumably are a part of that time-order.

In physics this time-order is now regarded as arising from absolute or ideal properties of a matrix. Surely this matrix must control evolution as much as it does physical or material phenomena which are described in its terms in physics? Dr. Dobzhansky's great review is thus more than a survey of high interest and large authority. It is a challenge to all who still believe that science can do without philosophy — otherwise, that any science can get very far without calling on every other science. In fact, these exchanges, including trading with art and religion (in a rational sense of the latter term), go on all the time, but slowly, through informal conversations and general reading. Why should they not be accelerated by conscious enterprise? F.K.

GENETICS AND THE ORIGIN OF SPECIES, Theodosius Dobzhansky, Columbia University Press, 379 p., bibliography and index. $4.25.

ECONOMICS AND INTELLECTUAL EVENTS

Editorial Summary

THE GREAT RANGE of subjects loosely called economics, from statistics to utopianism, appears now to require for contemporary purposes a great deal of reörganisation as a consequence of specific intellectual events. The economic and social structure is admittedly a compound of elements derived from human nature as well as from Nature. Usually the discussions of the human element centre on the cynical dogma "You can't change human nature." But this puerility need not deter us from examining the manner in which human nature has changed — for it does change, even if we cannot change the other fellow. After all, evolution goes on despite the sort of person who says the other fellow is hopeless and you cannot change him. Indeed, not only does evolution go on, but it appears that some people can and do change themselves even while they resist the enterprises of those who would have them change in their — the reformer's — way. Out of these changes arise definite intellectual events, new principles we come to live by, and the human factor in the social scene wants constant re-surveying so that the consequences of the changes may be brought into play to fullest advantage.

For the sake of clarity, six instances of psychological adjustments which have come over mankind in relatively recent times might first be listed:

1. During recent generations, the process of becoming highly self-conscious has been enormously accelerated all over the world. The stimulation of a full sense of individuality has been especially intense in the last thirty years, and proceeds at a great pace to-day, especially in the Orient. Since self-consciousness is the peculiar mark of man, it follows that human society depends for its development upon an adequate degree of this change among a sufficiently large number of people to make vivid self-awareness a general state. In primitive society, man's relation to Nature is marked by such beliefs as totemism, showing the sense of man's independence of animal, even of plant and stone, to be small. This is not to say that there are no values in such a society. The sympathetic and honest reporter is able to record fascinating examples of skills natural to animistic societies which are lost with the progress of individualisation. (I have often thought that fire-walking might be a useful art in a steel mill, whereas it seems useless in Tongan society!) In this connection a common error arising from our sense of superiority is the assumption that oriental peoples are part of primitive society. There are, of course, primitive elements in such vast populations everywhere. But the folkways of Arkansas do not prove that John Dewey is a fundamentalist. One would suppose that caution on this head is unnecessary. Yet experience shows a warning is in order, especially as regards India.

2. As we have recently pointed out (MAIN CURRENTS, August, 1942), this war is connected, among other things, with the real end of the isolation of Europe from the world context. That isolation was effected when the Moslem power cut Europe off from the rest of the world in such a large measure, and began to break down with the voyages of the Europeans of the teen-centuries of the Christian era. However, the isolation which arises from arrogance and condescension toward other peoples is only now coming to an end, so that we face a world-choice: Shall we genuinely befriend the East and Russia, or shall we, by a continuance of the suspicion and arrogance, unite half the population of the world against us? It is clear that decision herein involves respect for the cultural achievements of the East, as well as recognition of the struggles of Russia toward a genuine democracy, not alone political but economic. Whatever be our decision, the end of European isolation is an intellectual event. It can even come as a wholesome shock to people to find that they have to make a decision of this kind. One finds, especially, many excellent people who have for years been devoted to missionary effort awakening to the new situation with astonishment.

3. Within our own ideology is the return in triumph of a new realistic idealism or transcendental realism, described in our last issue. The social and economic import of this great intellectual event lies in its special nature, for the idealism is not a weak aspiration nor a belief or hope, inasmuch as we now see, through mathematical techniques, a union of the so-called ideal and the so-called real. Until this union became possible there were alternative social doctrines, each equally valid, because knowledge stood where it did then. On one side was, and still is in many government circles which have not awakened to the new intellectual event implied in Relativity, a faith in goodness linked with mere expertness. The idea is seen in our new government bureaus. One can honour the motives of such idealists while seeing the dangers of a bureaucracy and of the vast taxation inevitable. And when we set the other social alternative beside the program of the idealists (old style) we may almost be inclined to align ourselves with the people the American fascist press likes to call the do-gooders. The alternative is the anti-do-gooders, whose cynicism about "human nature" stems from selfishness, and leads in international affairs to the coining of pious-fraud phrases to cover anti-social acts: "sanctions," literally that which makes holy, for acts of violence to restrain the other fellow; "communal award" for imposing the evil of introducing religious considerations into the electoral procedure of India; "prosperity" for an economic hysteria which benefits a few at the expense of the many, and produces a fevered society such as we see coming to the end of its road to-day; "ethics" to mean enforced conformity to some pressure group, even in the professions. Few men in public life to-day have heartened us more than Mr. Willkie, who seems to have turned away from the anti-do-gooders and toward humanity once and for all. Fortunately for him and for all of us, the desperate alternative no longer exists between a pallid idealism, with outworkings which depend upon the persons who give it effect, and cynicism. Now that we know once and for all that the world is operated upon harmonic laws, that Nature itself is a harmonious process and a

wondrous unity, we have only to round out that knowledge (which is strong as yet only in the physical science field) into the domains of biology (as symbiosis) and of psychology (as ganzheit), in order to get great gains from this third intellectual event, the return of idealism in the new sense. Naturally, work must be done here, sound research, a good survey of knowledge. To this MAIN CURRENTS is committed, and for this it welcomes all possible help.

4. Within this event, just referred to, is the lesser item, the expansion of the meaning of order in science from mere dependability to a recognition of static symmetries and kinetic harmonies throughout all Nature and latent in man, as art, as social grace, as drama — in short, as life.

5. We have next the scientific attitude. Truly the scientific attitude is recent, so recent a gain that not a great many people have attained to it. But a very great many respect the scientific attitude and try, as best they can, to achieve it. We must place the responsibility for a failure to get far with this endeavour where it belongs: on education, on philosophy. The sciences have not been brought into unity. This is perhaps natural. But we could do more to show how little is the known and how vast the unknown: that the sciences show even vast lacunæ, especially in biology and in psychology. This has not been clear. Education for adults is a grievously faulty affair; and the training of children is certainly not strong on the science side. For by science we mean acknowledgement of man's ignorance, as well as satisfaction over his gains. The kind of scientific sensationalism, delight over gadgets, merely how to make things and make them go, the glossing over of serious malpractices in many departments of life which arise from pseudoscientific presumption — these are conspicuous parts of the national scene in our country. And, worst of all, the spirit of science is mistaken for something which should manifest as skepticism, or too large a dependence on what is so far known, as if the views of to-day, creditable as they are, were final. This is particularly so of biology and of psychology, and the physicist is involved insofar as he tends to take possession of those territories, to reduce them to vassalage. Nevertheless, the scientific spirit is a magnificent achievement, with enormous social implications and immediate values, scarcely used as yet.

6. The last intellectual event is part of the preceding item, yet particularly pregnant with power to affect the scientific attitude for good: the appearance of new studies in psychology which may lead to a good understanding of man's true nature and his place in the scheme of things. For the transition of the gestalt into a ganzheit psychology, the renewed interest in parapsychology and interest in semantics are important matters, even though they are but beginnings. No one can deny that physical beings, humanity, possessing a new psychological resource, self-consciousness, have been evolved. Why should we suppose that this recent event has been more than a beginning, that the real meaning of consciousness and its larger effect on the until-then merely animal psyche, is yet to be realized?

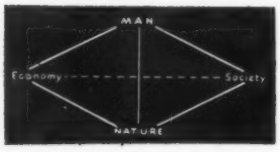
If the foregoing intellectual developments be admitted as important, then what bearing should they have upon a society such as ours, fairly clear as to its goals, but woefully confused as to methods? Thoughts on this point have occupied many minds, and much scattered writing deals with them. A collection of essays along these lines will be found in *Society Under Analysis*, by Twenty-one Coöperating Sociologists, edited by Dr. Elmer Pendell, admirable material, urbanely written, in the main, and free of dogma. There is no doubt that such collections are useful, so that the modern man or woman can be informed of anthropological backgrounds, the physical and chemical regularities of Nature (a narrow part of the whole, but sharply defined), and those of the earth's surface and mass, of biology, of psychology (the last increasingly less "regularities"), accepted elements which constitute a society in a formal sense. With the help of such publications we are able to read into our own society the conclusions of modern social anthropologists like Margaret Mead, socially-minded geologists like Kirtley Fletcher Mather, and others. But one finds a very small amount of summing up, of conclusions which are both valid and useful because they have kinship to the universals of mathematics. As a result, we stop at the point of description, and we have no base upon which to make those confident advances which are equally the right of science and the need of society — for we must, in short, plan and forecast.

Yet the whole point of science is that it should result in prophecy. The whole objective of social studies is that they should validate planning. However admirable and useful in a general sense, therefore, are writings which bring us up to date, if the operative principles of society cannot be deduced, then the applications are severely restricted.

Let us therefore recast our question: What bearing have the recent intellectual gains described above upon our power to study society in terms as universal as geometry? Is there such a thing as planning, and, if so, where are the social tectonic laws which interpret the laws of Nature into a rule of design in the way in which architecture interprets gravity, temperature, wind-stress, human psychological needs, power problems, ventilation, lighting requirements and other aspects of natural and æsthetic and moral law into the mandatory rules of architecture?

In answer to this question, the studies of the Guild of American Economists, to which we referred previously, apply so cogently that an immediate use is apparent for intellectual gains, structural meaning; as we see if we run over the six gains above, but in another order. (1) Self-consciousness in mankind is accompanied by a heightened sense of independence, a longing for freedom. The ratio is direct. Every time we say during this war that spirit will not be downed by tyranny no matter how strong physically the tyrant may be, or ruthless or false, we mean that self-consciousness as the warrant and testimony of spirit in man is developed in enough people to the stage where it counts. But does this not also imply that individual independence to act in the economic system, as against a wholly state-managed economy, is a part and projection of this spirit, this self-consciousness? (4) Again, if modern science more and more emphasizes the sym-

metrical and harmonic in Nature — that pattern, plan and design in abundance have supplanted gross matter in our new outlook on Nature, as Jeans has made so clear — then does it not follow that the only kind of warrant for post-war planning, must be a design of some sort made along the general lines of symmetrical polarities of man to Nature and society to economics which we discussed last month?



(5) If the scientific attitude has come to stay, as none can doubt, and (3) transcendental idealism or the guiding nature of the unsubstantial is the chief feature of the discoveries of that science, are we not compelled to seek a kind of economics for mass production in which what were once called natural and moral law are taken henceforth as parts of the same over-all philosophy? If a powerful idealism and (6) much that is hopeful in newer developments of psychology encourage us to think a good philosophy of life can be evoked in a peaceful world, and leisure thereby endowed with value, then surely efforts to get that leisure for all will be well spent, since the leisure will be employable for that which counts most, the search for knowledge, for philosophical security and enlightenment, and the fears, so common a few years ago, that leisure would be a disaster are no longer reasonable — if indeed they ever were?

One of the most interesting features of the work of the Guild of American Economists is connected with the second of the intellectual events above enumerated. The studies in question were done almost entirely in an atmosphere of pure reason. If they have led to valid conclusions must there not be evidence somewhere in history that men have previously hit upon the same truths now reborn in our time and, for our purposes, afresh? For we notice, as regards great ideas in which the unknown factors are the more and the data the less, as is necessarily the case with social thinking, that they have a tendency to reäppear in history. There is "a state of affairs" underlying the cosmos which is detected by insight, and thus, since the state of affairs is dependable, the rediscoveries in any given age must resemble those made in other periods.

So in this case. When we examine the balanced design for a planned economy that protects freedom instead of obliterating it, we notice that great operative professions quite naturally are responsible for each of the two polarities at the base.

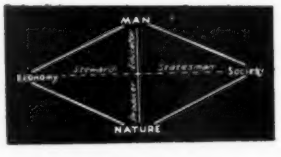
Clearly, for instance, the business of protecting society is a function of government, of statesmanship, let us say of the public services as they are now and as they are bound, in time, to become.

The job of producing from Nature that which is the means of an economy, goods, and the operative functions of a society, services, depends upon the manufacturer, the worker.

Clearly also, if an economy is to operate which is free, and is the complement to government in every respect, but functioning solely in the economic field, a proper profession must arise here in the economy also. Such a profession would be as devoted to stewardship as the public servant in the higher ranks should be to statesmanship. That such a profession does not yet exist is due to the related fact that there are no elaborated laws of mass production economics based on both the moral and natural law.

Finally, the relation of man as self-conscious individual, to the whole social order depends for its proper working upon the educator.

Thus we have four great departmentalisations of life, the educator, the public official, the economic administrator or steward and the manufacturer or producer. It is more than a little significant that such a patterned structure arrived at by sheer reason should resemble the most ancient of all Aryan social systems, the social polity of the Indian law-giver, Manu, in its ideal form. This is not an instance of borrowings from pseudo-orientalism, but a genuine fresh rediscovery of what may be taken as a natural relationship.



That this view should emerge, strongly documented and reasonable, at a time when the European is about to take his proper place in the world context again, is also highly significant. For the great difference between East and West is that the oriental mind, and especially that of the Hindu, has devised fine cultural techniques such as really advanced mathematics and used them chiefly for philosophical ends; while we have used such techniques for material ends. If we are to fuse these twin, essential employments of intellectual techniques, it is clear that a sound social-economic doctrine common to both branches of the human brotherhood should be arrived at in outline form at least. Such, it appears, is the result of the studies to which we refer, and such the conclusions we may draw from recent intellectual developments and the coming new economic structures. F.K.

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THE FREE WORLD Presses Forward

Pursuant to its announcement in August, 1942, of a department to survey the work getting under way through various organizations and groups attempting to make plans for the days to come, the Magazine FREE WORLD advances this with each issue. Extremely important is the American Section of the Free World Association, with Mrs. J. Borden Harriman as Chairman. This is a carefully organized body with which every American should be acquainted. It is dedicated to the following purposes:

1. To achieve a free world through a complete victory over the Axis Powers.

2. To establish human freedom based on equal political, economic, religious, and cultural rights for all mankind, regardless of race, creed or colour.

3. To protect peace and freedom and economic security through the development of a democratic world organization comprising representatives of all nations, based on the principles of collective security and recognition of the political and economic rights and responsibilities of all men.

4. To assure the functioning of this world organization through an international judiciary, such as an expanded world court, devoted to the attainment of political and social justice.

5. To organize and maintain an international police force to prevent aggression and to assure the enforcement of law and order.

The specific functions of the American section, in addition to support of the principles and purposes of the Free World Associations, will include the following program:

1. To preserve democracy on the home front and in world affairs.

2. To urge the prosecution by our Government of active political warfare on a world-wide basis, utilizing the democratic forces of all nationalities represented in this country and all over the world, particularly in Latin America; giving unqualified support to resisting movements in occupied countries; carrying on aggressive, politically directed anti-Axis propaganda through every available channel.

3. To urge the adoption by our Government of a consistent, vigorous anti-fascists foreign policy. We must end policies of appeasement which strengthen the forces of reaction and play directly into the hands of the enemy. It is impossible to wage successful political warfare by coöperating with fascist governments, while the populations of Europe are being persecuted by them.

4. To urge the creation of a supreme council of the United Nations dealing with political and economic matters. An essential function of this council must be to formulate a clear-cut plan for post-war reconstruction and a democratic world order.

5. To urge the abolition of discriminatory policies against the people of Asia. We must renounce special privileges in the form of extraterritorial concessions, and we must end national and racial discrimination in the fixing of immigration quotas. The immediate effect of a friendly policy toward the people of the Far East would be to deprive our enemies of one of their most useful weapons. In addition, it would open the way for more effective coöperation between the United States and China, whose combined influence can have a decisive effect upon India and can do much toward making that immense country an active partner with the United Nations.

THE American Free World Association will mobilize American public opinion by working in close cooperation with already existing groups having similar aims, by creating local chapters of Free World, by securing individual memberships in the Free World Association, by increasing the support for FREE WORLD magazine. We propose to organize mass meetings, institutes, round-table discussions, and to utilize other methods of popular education.

If you believe in the principles of the Free World Association, apply today for membership.

AMERICAN FREE WORLD ASSOCIATION
Fifty-five West Forty-second Street, New York City

In its Department, in the August issue, FREE WORLD presented the following group activities:

I. Commission to Study the Organization of Peace.

Established immediately after the outbreak of the war in Europe to study the reörganization of the world for peace, in preparation for the vast work of reconstruction which will face the world upon the termination of this conflict, the Commission issued a seven-point program. This is, briefly:

1. "We believe that war can and must be eliminated.
2. "We regard as essential . . . freer commercial interchange between nations and more equitable labor and living standards.
3. "Democracy must concede to each nation the form of government which its people desire, subject to the assurance by law of standards of indivdual liberty within each nation, and subject to an international guarantee against agression by any nation. We hold that an international Bill of Rights, with such guarantees, is an indispensable basis of our own peace and security.
4. "We believe that international peace requires adequate guarantees for racial, religious and political minorities.
5. "We will work toward the furtherance of international understanding through the free interchange of ideas and knowledge between peoples.
6. "We believe that the United States should be prepared to assist . . . in meeting the post-war emergencies of starvation and disorder and in restarting the wheels of industry.
7. "The forces of lawlessness now dominant in so much of the world should be checked and overthrown."

"The Commission asserts that the organization of peace 'must have back of it the force of a unifying ideal. The sovereignty of the nation-state is no longer adequate. The alternatives are world empire, achieved by conquest, or some form of association, such as world

federation, achieved by consent. . . . As a civil community gives to the individual a security in his rights, a richness of social life and an economic surplus in which he can share, more than compensating for the freedom he sacrifices, so any future federation of nations must offer to its units political and economic security, cultural intercourse, and the opportunity for a high plane of living that will more than compensate for the sovereignty sacrificed.'

"The Commission comes to the following conclusions to be borne in mind during subsequent consideration of the problem: 'Reconstruction can only be undertaken upon an international basis, though it seems probable now that the American people must be prepared to assume a large part of the responsibility. The work of reconstruction must begin immediately upon the cessation of hostilities; the rapidity with which supplies can be sent and political control established may prevent bloody civil wars. Consequently, plans should at once be formulated; we cannot wait to improvise them when the shooting stops. The success with which the problems of reconstruction are met will have much to do with making possible the final organization of a peaceful international society. To organize such a society, it will not be enough to seek to restore what we had before; the hope and aspiration for a better world with higher social standards must be satisfied.'

II. Department of Agriculture — Inter-Bureau Committee on Post-War Planning

"The Department of Agriculture defines the first and biggest post-war job in the following statement: 'We must transfer an estimated 23,000,000 to 26,000,000 persons from war activities back to peace-time production. The great machine the nation is building for destructive purposes of war can be used just as fully for the constructive purposes of peace. And people can work just as hard to make the world a better place to live in after the war as they are now working to defeat our enemies during the war.'

"The Department has issued a pamphlet series outlining the work of agricultural post-war planning. The interdependence of agricultural and industrial workers has been emphasized by the use of 'graphic charts presented in their pamphlets' which show that 'farmers cannot be prosperous unless the people who buy their products are also prosperous.' The International Wheat Agreement might well be the first one of many such agreements dealing with other basic products.

III. Federal Union

"Clarence Streit's organization has expanded it's ideas from Union Now with nations with whom we have 'compelling natural ties' to 'all the nations of the world.' "

WORLD PURPOSE TODAY

Unity and Plan

(At a rally of the Canadian Aid to Russia Fund held in Toronto on November 25, 1942, Mr. Wendell L. Willkie spoke at length upon the war and peace. From the New York Times of November 26, we quote, verbatim, portions that deal with definition of purposes. Mr. Willkie stressed in his opening words the dramatic significance of the meeting itself — a meeting of citizens of the British Commonwealth of free nations, assembled to pay tribute to their Russian allies, and inviting him, a private citizen of another allied nation, to speak before them. As a private citizen he is obviously free to say what officials feel that they may not say, and to say it perhaps in an exaggerated degree. We may disregard the degree, however, the real point being that he is saying these things. Even if they be construed as political opportunism — even if they be partly that — at least they are splendid things and they are being said, and they should be of permanent record. Reports are to the effect that Mr. Willkie was asked, and presumably agreed, to say nothing about India — which he does not mention. F.K.)

"So this meeting symbolizes the essential nature of the war we are fighting today. For this war is either a 'grand coalition' of peoples, fighting a common war for liberation, or it is nothing. It must be either a great pooling of all our energies, inspired by united strategy, planned and fought on a global scale, or it will be lost.

"Finally, as we are doing here tonight, we must talk about this war as united peoples; we must discuss its issues; we must declare the common purpose which drives us all; or we run the risk of having worked and sacrificed and suffered to win a war for no purpose."

In his world-tour flight Mr. Willkie "found encouragement and hope on all the fighting fronts. And I found the resolution to win in the minds and hearts of the people behind those fronts."

"But I also found — and this troubled me greatly — I also found worry and doubt in the hearts and minds of the people behind those fronts. They were searching for a common purpose. This was plain in the questions they asked about America after the war, about Great Britain, about Russia. The whole world seemed to me in an eager, demanding, hungry, ambitious mood ready for incredible sacrifices if only to justify the sacrifices already made.

"Europe in 1917 was probably in much the same mood. It is an inevitable corollary of blood and war-weariness. Then, in 1917, Lenin gave the world one set of answers. A little later Woodrow Wilson gave it another. Neither set of answers ever became blood-and-bone part of the war, but were superimposed on it, in the peace. So neither set of answers redeemed the war or made it anything more than a costly fight for power. It ended with an armistice, not a real peace.

"I am saying to you in Canada — as I have said all over the world — that the people must define their purposes during the war. I am quite deliberately trying to provoke discussion of those purposes between the peoples of the various countries of the world. For I live in a constant dread that this war may end before the people

of the world have come to a common understanding of what they fight for and what they hope for after the war is over.

"I was a soldier in the last war, and after that war was over I saw our bright dreams disappear, our stirring slogans become the jests of the cynical, and all because the fighting peoples did not arrive at any common post-war purpose *while they fought*. It must be our resolve to see that that does not happen again.

"Our leaders, jointly and singly, have expressed some of our common aspirations. One of the finest expressions came only the other day from General Chiang Kai-shek in a message to the western world, delivered through The Herald Tribune Forum in New York City. He concluded: 'China has no desire to replace Western imperialism in Asia with an Oriental imperialism or isolationism of its own or of any one else. We hold that we must advance from the narrow idea of exclusive alliances and regional blocs, which in the end make for bigger and better wars, to effective organization of world unity. Unless real world coöperation replaces both isolationism and imperialism of whatever form in the new interdependent world of free nations there will be no lasting security for you or for us.'

"Let me read you another statement of purpose, singularly explicit and exact: 'Abolition of racial exclusiveness, equality of nations and integrity of their territories, liberation of enslaved nations and restoration of their sovereign rights, the right of every nation to arrange its affairs as it wishes, economic aid to nations that have suffered and assistance to them in attaining their material welfare, restoration of democratic liberties, the destruction of the Hitlerite regime.'

"Is that a statement by Winston Churchill or is it a statement by President Roosevelt? It might well have been written by the authors of the Atlantic Charter, but it happens to be Stalin's definition of the objectives for which we fight. So he defined them on Nov. 6, 1942, on the occasion of the twenty-fifth anniversary of the October Revolution.

"Other statements of purpose by our leaders have been phrased as hopes or intentions. This, Mr. Stalin calls a "program of action," a program for Britain and the British Commonwealth of Nations, for the United States and for Russia.

"Now I am going to . . . ask you whether any citizen of any of the great democracies could find anything in it to which to object. . . . I, for my part, find just one objection: Mr. Stalin limits his program of action to the Anglo-Soviet-American coalition. It should be applied to the world.

"We may ask: Does Stalin mean what he says? Some will point out that only two years ago Russia was in alliance of expediency with Germany. I make no defense of expediency, military, political, temporary or otherwise. For I believe the moral losses of expediency always far outweigh the temporary gains. And I believe that every drop of blood saved through expediency will be paid for by twenty drawn with the sword.

"But a Russian, feeling that by the German alliance his country was buying time, might well remind the democracies of Munich and of the 7,500,000 tons of the best grade of scrap iron my country shipped to Japan between 1937 and 1940.

"Perhaps we can better measure the good faith of Stalin's statement in the light of the millions of Russians who have already died defending their fatherland and of the 70,000,000 Russians who have become slaves of the Nazis; in those other millions of Russian men and women who are working feverishly sixty-six hours a week in factories and mines to forge and produce instruments of war for the fighters at the front; in the effort that went into the almost miraculous movement of great factories hundreds of miles, that they might operate uninterrupted, beyond Nazi reach. For it is in the attitude of the people that we may find the best interpretation of Stalin's purpose.

"And while we are questioning Russia's good faith, we might well ask ourselves: Are we prepared to carry out our avowed programs? Are we willing to give our declared purposes reality? To do so will undoubtedly mean different methods for each of us. You in Canada know your own problems. We in the United States have ours. We must guard against the recurrence of dollar and pragmatic diplomacy. We must guard against the use of the great moral force of our country not for the liberation of mankind but for the maintenance of the old international order — the spawning ground of the present struggle. We must educate ourselves to accept the economic changes which must take place in this world.

"But most important, it remains for us to convince those people to whom we are promising freedom and opportunity, that we really believe what we declared to be self-evident truth in our own Declaration of Independence: That all men are created equal. If we are to convince others of our good faith, we must see to it that racial and cultural and economic exclusiveness belong to the past, within, as well as without, our own borders.

"The people of the world must win this war. The people of the world must win the peace. And so I come to you tonight not to plead for help for Mr. Stalin or help for the Union of Socialist Soviet Republics. I ask you as men and women to give aid to the men and women of Russia. We are here to honour and to help a brave people who are our allies. . . .

"Five million Russians have been killed, wounded or are missing. The great fertile farm lands of Southwestern Russia are largely in Nazi hands. Their products are now feeding the enemy and their men and women are forced to be his slaves. Thousands of Russia's villages have been destroyed and their people are homeless. Her transportation system is overloaded; her factories, producing to the very limit, require the full output of her remaining oil fields and coal mines.

"The Russian people are turning sorrowfully to the democracies of the West for hope and aid. We must not fail them. For just as the African front is Russia's front, so Stalingrad and Moscow are our fronts. And the Russian people behind those fronts, who are our allies today, must be our friends tomorrow. It is with them that we must work to make this war what their leader has called it: 'A great war of liberation.'"

EAST AND WEST

"HALF THE WORLD'S PEOPLE are in Asia," is the startling line across the EAST AND WEST ASSOCIATION'S prospectus. What does this mean in the light of today? It means that "it is not western peoples alone who make this war, and it will not be western peoples alone who make the peace. For the first time in history the whole human race will shape the world in which it will live, for all are involved in the war."

This is the reason for this association and the line of activities which it will carry out. "Americans need to know the other side of the world, as the people over there need to know us. In the conflict beyond the Pacific is being forged our future. Turkey and Syria are pivots in the war in Europe. India with her millions is a question-mark. . . . China is in the fifth year of her fight for independence. In a new and significant sense the fate of each of these countries will affect our country. . . . Lest we understand too little and too late, we, the peoples on both sides of the Pacific, must come to understand quickly."

The Association's plans for future work cover every field of communication through which dissemination of essential knowledge may be effected — radio, motion pictures, the press; forum organizations and study organizations, to which study programs will be supplied; supplying to interested groups lecturers qualified to discuss the Orient, Australasia and the United States and also qualified musicians, artists and other such persons in specialized fields; fostering translations of the works of Eastern and Western writers into the languages of West and East; one or more illustrated magazines and also a monthly news letter for the members of the Association; and "constant exploration of any other possible means" whereby the educational work and interchange of information may be vigorously carried on.

The Association owes its inception and founding to Pearl S. Buck. Dr. Lin Yutang is Chairman of its Intercultural Committee, which is "composed of representatives of the various cultures and countries with which the Association is concerned," and which will serve as general guide and counsel to the Association's activities both here and abroad. Its officers, Board of Directors and Advisory Board make up a roster of the most distinguished names among American thinkers, scholars, writers, and men of affairs, while it is all summed up, as it were, in Pearl Buck's concluding note: "When you have read this booklet you will see that the East and West Association is in itself a means of communication between peoples, a road between the East and the West. Whether this road is kept open, whether it is made into a real highway of understanding, depends upon you. If you believe in it, if you want to share in it, we welcome you in any way in which you can help." The address is EAST AND WEST ASSOCIATION, 458 Graybar Building, New York City. Tax exemption has been granted by the United States Treasury Department to all moneys received by the Association, which is completely a non-profit organization.

From the EAST AND WEST ASSOCIATION, transition to Professor William Ernest Hocking's superb essay on "*A New East in a New World*," which appeared in *Fortune* for August, 1942, is inevitable. This essay is Professor Hocking's answer to the critical question whether or not East and West can meet on common spiritual ground. It is of such deep significance that reprints of it have been issued, and these may be had, at no charge, by writing to *Fortune* Magazine, *Time & Life* Building, Rockefeller Center, New York City.

This 'Twain' Must Meet!

"At a late hour, man has finally become world-conscious. But western man still does not know that it is not his world alone." These stern words, editorially spoken, are the introduction to Professor Hocking's analysis and careful conclusions. The difficulty of quoting from matter of this character lies in making selections from the riches which it offers. Nothing can be omitted! From the assertion in the very first lines that, "if there is a common science the world over, there will have to be a common conscience as well," to the concluding explanation that "in this story we have spoken only of the sources of conscience in East and West, not of its applications," every paragraph and every line is pregnant with meaning and should not be missed.

"It is the New East and not the traditional East with which we have to do." But "there is an obstinate lag in the Western mind, refusing to believe that there is any New East. It desires . . . the strange and different; to retain its India of mystery, vastness, dread; of the yogin, the sadhu, the ascetic; of tangled castes, child marriages, dark rites in the fastnesses of immense temples fantastically adorned; of human extremes in pride, beauty, degradation."

Admitting that there is a "grain of truth in this persistent emotional identification of Asia with its past, since no civilization can drop its past any more than a man can drop his memory and still be himself," the author goes on very definitely and positively to say, "There is a New East, the fruit of long change, slowly maturing in its whole fabric by reaction to an irritating, astringent, penetrating West, and by dint of the present catastrophe, which precipitates results prepared by the subconscious reflections of a thousand years of apparent stagnation. To appraise the East, which we desire to meet, we must see both its inheritance and its present type of purpose."

On the principle of taking the hardest problem first, Dr. Hocking proceeds to examine "the mystical trait in Indian life, approaching it by way of the mysticism of traditional India," after having warned that "the mystic is defined as a man with whom you cannot do business!" Here he recounts an interview with "the old sannyasin" who came to see him during a visit to Bombay. This man had retired from his position at the head of an important temple because the business of his office interfered with his own spiritual life. Why did he do this? "Because quiet reflection about the world was important to him; he needed freedom to think. This helps to explain, by the way, why we do not do it, and why we consider it queer."

Asked to give an example of the illusions of which he desired to rid himself, he said "let us take these walls as an example of something we might consider real. Assume they are made of brick. Then let us unbuild the wall,

brick by brick. Have we destroyed anything?" "No." Have we not destroyed the wall?" "Yes."

"Then by your answers the wall was nothing. But let us say, it was not real: it was simply the form into which the bricks were set. Now it is the bricks we will consider real, not the wall. But let us pulverize a brick. We have destroyed the brick; yet again we have destroyed nothing. The brick was not real: it was simply the form into which its particles were molded. Could this process not be continued with the brick particles?" "Yes." "Without limit?" "Perhaps."

"In his own way the swami was following out the problem of the analysis of matter, and finding (with modern physicists) that matter resolves itself at last into something immaterial. For our physical science also, the world of experience is quite different from the ultimate truth of things and has therefore an aspect of illusion; but physics tends to rest in the superior reality of the electron, the swami (with support from Eddington and Weyl) in the superior reality of the self. Which is nearer the truth?"

"As I looked at the aged man, I saw in his eyes and bearing a quality which we of the West, busy and concerned about many things, seldom achieve. A freedom not political nor economic, but inward and therefore real. 'Freedom from fear' . . . this man had it. He had nothing: I could give him nothing but my attention — and a cup of tea. But he had reached one of the goals of living."

Pointing out that the European visitor rarely encounters the old sannyasin — that he sees instead the fakirs and the self-exhibiting ascetics and supposes that these are Hinduism — Professor Hocking declares that the sannyasin as an ideal will not be set aside. The man who renounces and gains moral strength thereby, belongs to the new India also — the man who, like the old sannyasin, seeks mukti or "salvation" but seeks it in the midst of action. "He too frees himself from greed and fear; but he uses this freedom to fight wrong with a clear and unpurchasable judgment. He too finds his strength in solitude; but he exercises it in the market place, perhaps in politics — a strange sort of power, based solely on his honesty, his clearness of head, his courage, and his freedom from personal ambition. . . . The new India, like the old, retains its mystery, which is simply the mystery of all depth to those of shallower self-confidence. It was one of the earliest of Indian thinkers who said these words: 'Into blind darkness pass all those who worship ignorance; Into greater darkness, those who are content with knowledge.' Beyond 'knowledge' is insight. India's most characteristic possession — a pervading sense of the identity of all life with the highest spirit, their Brahm — goes far in this saddest and most gifted of lands to draw the sting of social dividedness and want. It might become a religion of resignation and escape; it has often been so interpreted; but it is held off from that by such calls to action as this from the Bhagavad Gita:

'It is not by abstaining from activity that freedom is won;
Neither by mere renunciation can one achieve perfection.
Not for an instant can the yogin be really motionless.
If he sits in firm control of his limbs and breath,
Allowing his mind to sport with the images of sense,
He does but deceive himself and is known a hypocrite.
But let him control by his mind the wandering of his senses,
Let him carry out action without being attached to results,
He is the true yogin; he is worthy of release.
Do thou perform right action;
For action is superior to inaction.'

Turning from India to China, Professor Hocking explains that China's extraordinary position in the New Asia is "due largely to the fact that it is still the 'Middle Kingdom' of the mind, traversed by all the currents of thought which affect Asia and governed now as in the past by a wise selectiveness which accepts nothing without modification and rejects nothing without a hearing. It has received from India for two thousand years; for thirteen hundred years it has transmitted to Japan; it has sent students to all parts of Asia; the mariner's compass is a Chinese device. Before this intercourse began, the ancient teachers of China gave it the mental keys for unlocking the strange thoughts of other peoples, even of India.

He compares the two great teachings of Confucius and Lao-tse. China "needed both: it set Lao-tse on a pedestal of mystified respect," choosing the "practical, sober to the point of platitude, systematic and explicit" Confucianism as its everyday guide. Thus it becomes difficult to think of Lao-tse as a product of Chinese soil, although "the main outline of his teaching is so simple as to be self-evident, once we grant two things: first, that the world has its unity underneath all its 'ten thousand things;' second, that the character of this unity eludes all effort to define it. Confucius showed no interest in the first point and took no stock in the second. In both respects the typical Western temper (modern style) tends to be Confucian; the Indian temper is with Lao-tse. . . . Herbert Spencer once put the same view into other words. . . . The difference between Spencer and Lao-tse is that for Spencer the Unknowable is recognized and then dismissed as useless; for Lao-tse it is kept in mind as a standard for human life. . . . Here we have something to learn from the Orient. Let us recall that Lao-tse did not use the term 'unknowable'; he said 'unnameable.' . . . For ourselves, we should prefer the expression 'indefinable' or 'indescribable'; and our question is *whether we can know what we cannot define*. Here . . . the answer is a clear yes. Meaning is first, language afterward; knowledge is first, definition afterward; nothing of first-rate importance is fully sayable or definable. We come to agreement with Lao-tse."

Space allows no more — except the author's summing up. In his very last paragraph Professor Hocking's unprejudiced consideration of the whole matter finds expression: "I am not meaning to deny that differences are deep and serious; "(between East and West of the past and the present)" I am deliberately presenting only what needs to be thought of at this moment. Human types are not equal in force of conscience; men may well agree on principles while varying profoundly in their fiber for giving effect to them. There are in the world the weak, wriggling, dishonest and cowardly mentalities; we cannot equate men in terms of stamina and

reliability. Willingness to oppose, an honorable pugnacity towards self and others, must enter into the building material of strong peoples and any workable world order. Justice has to operate with sympathy but also with a set jaw. We cannot forget the problems of moral psychology lest the saying 'The meek shall inherit the earth' becomes in practice 'The sly shall inherit the earth.'

LABOUR'S VOICE IN ENGLAND

By the Rt. Hon. Ernest Bevin, M.P.

"War today involves the whole people. Our minds are still influenced too much by the armies of the past, and we are not sufficiently regardful of the total character of modern war.

"The Prussian always acts on the assumption that the human being is an automaton, that he can be organized, ordered and driven, and reduced almost to the condition of a robot.

"But we, in this country, for more than a hundred years, have accepted the opposite view. We have believed that the road to the highest achievements of civilization and human attainment lies in the expansion of freedom.

"Even before Labour was represented as it is today, or even hoped to achieve actual power, there was a growing recognition, as a result of the agitation of economists, philosophers, statesmen and early Trade Union leaders, that the future security of Britain lay in two directions. One was the development of the right of self-government in the highest sense, which means the right of a people to determine such matters as its life and death, and the second the right of the masses of the people to develop free organizations.

"The real cause" (of this present struggle) "was the failure to base the settlement of World War I on the definite acceptance of the really fundamental principle that the government should be responsible to the people.

"It is really due to the fact that we in the Trade Union and Labour Movements are wedded to the principle of freedom, of mutual aid, of policy and direction of the State being really vested in the people, that has brought us now to such a grim determination to see this issue fought out.

". . . We in this country have to see to it that we are not influenced only by questions of geography or what has been described as vital interests — the term 'vital interests' being expressed in communications, spheres of development or even raw materials. We have to go deeper, and place the principles of peace higher than anything else or we shall have condemned another generation to renew the struggle. We must be free men and women, or slaves, and as long as the issue remains unsettled recurring conflict is inevitable.

"The guiding principle that must actuate those who stand for the principles here adumbrated, must be that, in working out the destiny of our people we guide them towards a new world order, an order that involves the expulsion of the unworthy idea, willingness to restrict voluntarily our sovereignty, and an acceptance of obligations to work with others in the world in a great common endeavor to produce a higher civilization."

No new world can be built on a liberalism devoid of iron."

It is good to note that Professor Hocking's name is among that roster referred to earlier in connection with the East and West Association. This distinguished Professor of Philosophy at Harvard University, is a member of the Association's Advisory Board.

TODAY'S ECONOMICS IN 100 PAGES

Book Notice

This is an admirable book, showing very clearly the necessity for America, and the world, to shift from a capital debt economy — in which, for instance, a bridge is built at a generous original cost of three million dollars, and is "financed" by bonds till it costs six, nine or twelve million — to a consumer-producer economy. In this the bridge — still generously paid for at the start — would also be paid off by immediate tolls. The authors do not use such an instance. Instead they call our attention to short-term producers' loans such as are made on bills of lading and paid off on goods delivered, as against great capital debt structures associated with our powerful corporations. In these personal liability is limited, which can lead to a variety of abuses.

The book is a clear argument for retention of our freedom through avoidance of state ownership with its bureaucracy and taxation and political perpetuity of power, by buying out and otherwise ending the present debt economy. It deals with the threat in the war debt, if this is to be a capital debt. In short, a straightforward, simple, essential book. For a person who wants his economics without fanaticism and without a technical word and wants it now as of today, this is about the best dollar's worth in sight. We would like to see these authors pursue the theme of education to create a cadre of professional persons who could operate a free economy.

Freeing Democracy, A New World Challenge. Constance and George Macdonald, The New World Press, 297 Fourth Avenue, New York, 106 pages, $1.00.